

WHAT IS CLAIMED IS:

- 1                    1.        A substrate processing chamber having at least one component  
2        bearing a rare earth-containing coating bound to a parent material by an intervening  
3        adhesion layer, such that the component exhibits resistance to etching in a plasma  
4        environment.
- 1                    2.        The substrate processing chamber of claim 1 wherein said rare  
2        earth-containing coating is selected from the group of Yttrium fluoride, Yttrium oxides,  
3        Yttrium-containing oxides of Aluminum, Erbium oxides, and Neodymium oxides.
- 1                    3.        The substrate processing chamber of claim 1 wherein the  
2        component is selected from the group comprising a chamber liner, a chamber dome, a  
3        chamber wall, a cover plate, a gas manifold, a faceplate, a substrate support, and a  
4        substrate support/heater.
- 1                    4.        The substrate processing chamber of claim 1 wherein the  
2        adhesion layer comprises a graded subsurface layer of rare earth material formed in the  
3        surface of the parent material.
- 1                    5.        The substrate processing chamber of claim 4 wherein the  
2        adhesion layer comprises a subsurface rare earth layer resulting from a changed energy  
3        of bombardment during introduction of rare earth material into the parent material  
4        through an IBAD process.
- 1                    6.        The substrate processing chamber of claim 4 wherein the  
2        adhesion layer comprises a subsurface rare earth layer resulting from a changed  
3        implantation energy during introduction of rare earth material into the parent material  
4        through a MEPIIID process.
- 1                    7.        The substrate processing chamber of claim 1 wherein the parent  
2        material comprises aluminum nitride or aluminum oxide.
- 1                    8.        A method for treating a parent material for corrosion resistance  
2        to plasma comprising:  
3        forming an adhesion layer over a parent material; and

4 forming a rare earth-containing coating over the adhesion layer.

1 9. The method of claim 8 wherein the rare earth-containing coating  
2 is formed by deposition of rare earth-containing material.

1 10. The method of claim 9 wherein rare-earth ions are introduced by  
2 conducting reactive sputter deposition in an oxygen-containing ambient.

1 11. The method of claim 8 wherein the adhesion layer is formed by  
2 introducing rare earth metals into the parent material at varying energies to form a  
3 graded implant layer.

1 12. The method of claim 11 wherein the adhesion layer is formed by  
2 an ion bombardment assisted deposition (IBAD) technique employing bombardment of  
3 a deposited rare earth layer with inert Argon ions at changed energies.

1 13. The method of claim 11 wherein the adhesion layer is formed by  
2 accelerating rare-earth ions at the parent material at changed energies of implantation.

1 14. The method of claim 13 wherein rare-earth ions are accelerated  
2 using a MEPIIID ion implanter.

1 15. The method of claim 8 wherein the rare-earth containing coating  
2 is formed by exposing a rare earth present on a surface of the parent material to a  
3 fluorine ambient.